A PROSPECTIVE STUDY OF DIAGNOSTIC LAPAROSCOPY IN CHRONIC ABDOMINAL PAIN

Dissertation submitted in partial fulfillment of regulation for the

Award of M.S. degree in General Surgery

(Branch I)

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CERTIFICATE

Certified that this is the bonafide dissertation done by DR.A.AGNETIA VINOTH and submitted in partial fulfilment of the requirement for the award of M.S. Degree in GENERAL SURGERY (Branch I) of The Tamilnadu Dr.M.G.R. Medical University, Chennai.

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DECLARATION

I solemnly declare that the dissertation titled "**A PROSPECTIVE STUDY OF DIAGNOSTIC LAPAROSCOPY IN CHRONIC ABDOMINAL PAIN"** was done by me from September 2011 to august 2012 under the guidance and supervision of PROF. DR.P.V.VASANTHA KUMAR.M.S.,

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Abstract

Chronic abdominal pain is a common complaint which is difficult to manage by both physician and surgeon. It is the 4th frequent chronic pain syndrome in general population (1). This condition affects the patient both physically and psychologically. More than 40% of the cases the specific etiology for chronic abdominal pain remains undiagnosed by our routine physical, laboratory and imaging. With the introduction of the diagnostic laparoscopy new tools has been added to our knowledge. Laparoscopy can identify abnormal findings and improve outcome in majority of the patients with chronic abdominal pain. This study is mainly designed to highlight the significance of laparoscopy in diagnosing the etiology of chronic abdominal pain and impact on the treatment and post-operative pain relief. Appendicular pathology is the leading cause for chronic abdominal pain of unrevealed etiology and it is about 33%, followed by adhesion is about 23%. Positive outcome is 80% in the follow up of 1 month and 90% of the patients got complete pain relief in the follow up of 3 months. Conclude that Diagnostic laparoscopy is a safe and effective tool to establish the etiology of chronic abdominal pain and allows for appropriate interventions.

Keywords: Diagnostic laparoscopy, Chronic abdominal pain, Appendix, Adhesions, Biopsy, Adhesiolysis, Tuberculosis.

CONTENTS

INTRODUCTION

Chronic abdominal pain is a common complaint which is difficult to manage by both physician and surgeon. It is the 4th frequent chronic pain syndrome in general population [1].

This condition affects the patient both physically and psychologically. Although this patient undergone numerous diagnostic work up definite diagnosis remains challenge to the surgeon.

With the introduction of the diagnostic laparoscopy new tools has been added to our knowledge. Laparoscopy can identify abnormal findings and improve outcome in majority of the patients with chronic abdominal pain.

This study is mainly designed to highlight the significance of laparoscopy in diagnosing the etiology of chronic abdominal pain and impact on the treatment and post-operative pain relief.

It also expresses diagnostic and therapeutic value of laparoscopy in chronic abdominal pain which is a most debilitating illness.

AIM OF THE STUDY

To evaluate the diagnostic and therapeutic value of laparoscopy in chronic abdominal pain. Patients with chronic abdominal pain, undiagnosed by routine laboratory and imaging modality were enrolled in this study, their clinical presentation, intra operative findings, various occult etiology and clinical improvement were evaluated in this group, which will improve the awareness and importance of diagnostic laparoscopy among the surgeons.

OBJECTIVE OF THE STUDY

- To find the various unrevealed aetiology for chronic abdominal pain.
- To analyse the accuracy of diagnostic laparoscopy in chronic abdominal pain.
- To evaluate the efficacy of laparoscopy in management of chronic abdominal pain.

REVIEW OF LITERATURE

History

The first laparoscopic examination was performed by GEORG KELLING, and he called it as "CELIOSCOPY". In 1901 he performed this procedure on the abdomen of a dog using a Nitze-cystoscope.

Prior to the cystoscopic viewing of the abdomen, Kelling insufflate the peritoneal cavity with filtered air via a device known as trocar. Insufflations were used to create a pneumoperitoneum in order to prevent intra-abdominal bleeding in those days.

In 1901 D.O.tt a Russian Gynaecologist demonstrated "ventroscope", by illuminating the abdominal cavity using culdoscopy during pregnancy.

"New instrument for puncture of the thoracic cavity for pneumothorax", was published by Janos Veress of Hungeri in 1938. This needle became popularised and nowadays it is commonly used to create a pneumoperitoneum.

Richard Zollikofer of Switzerland insisted that CO2 to be the preferred insufflations gas in 1924. Prof. Kurt Semm developed automatic gas insufflators in 1960. From 1964 he played an important role in the development of laparoscopy. The next 15 to 20 years he created so many laparoscopic instruments and techniques.

The first video guided surgery was demonstrated by Prof. Kurt Semm. He did the first laparoscopic appendicectomy by using a television monitor. In 1985 CCD camera system was utilised to perform more than 80 laparoscopic cholecystectomies by a German Surgeon.

The first laparoscopy cholecystectomy in human was demonstrated by Mourt, Lyon in 1987. Within a year Dubois, Perisiat, Cuschieri, Mckeman, Saye, Reddick and Olsen performed the same at their institution.

Laparoscopic assisted appendicectomy was performed by Dekok in 1977. Ligation and excision of the appendix was done through a small laparotomy. First incidental appendicectomy was done by Semm in 1983 and Patrick O Regan performed laparoscopic appendicectomy for acute appendicitis.

After 1987 Pier and Gotz reported 625 laparoscopic appendicectomy, after that laparoscopic appendicectomy became popular. Arrigui was the first surgeon who developed preperitoneal mesh repair for hernia. Fitzgibbons, Filipi and Salemo demonstrated intra peritoneal onlay mesh repair in 1990.

Bailey and Zuckr in USA popularised the anterior highly selective vagatomy with posterior truncal vagatomy.

Dr. Bernard Dallemagne of Leig, Belgium performed the first laparoscopic Nissen Fundoplication in 1991.

History of diagnostic laparoscopy goes 100 years ago. Initially Gynecologists and Physicians were very much involved in laparoscopy in looking the female pelvic organs and liver in hepatic disease respectively.

It was rarely performed by general surgeon except in few centre like Europe in those days [(2)]. A Swedish physician, **Jacobaeus** described laparoscopic examination of abdominal organs in human in 1910 [(4)].

Bertram Bernheim reported two cases of diagnostic laparoscopy in U.S in 1911, one of which he found advanced pancreatic malignancy and he termed it as "Organoscopy"[(4)].

H.Kalk, a German published "Experience with laparoscopy together with the description of a new instrument", in 1929 and also he demonstrated the role of angled laparoscope in diagnostic laparoscopy.

In 1930, an American Surgeon, Ruddock documented 500 cases of diagnostic laparoscopy [(3)]. Laparoscopic cholecystectomy was described in 1980 and got popularized. After that General surgeons were very much interested in doing diagnostic laparoscopy.

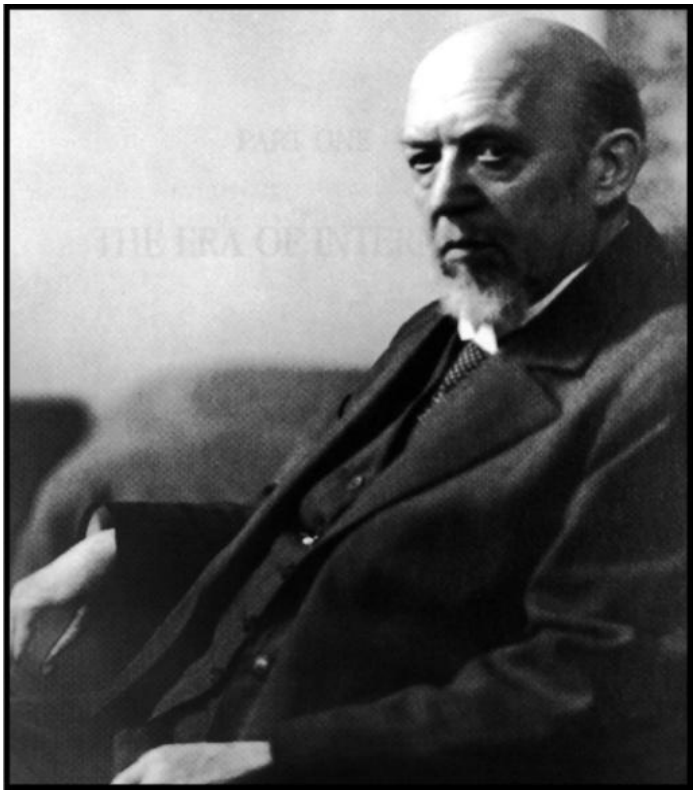


Figure .1 GEORG KELLING

LAPAROSCOPY

The unique feature of laparoscopic surgery in the peritoneal cavity is to lift the abdominal wall from the abdominal organs. Two methods have been devised for achieving this.

The first one is creation of pneumoperitoneum which is preferred by most surgeons. In earlier days intra peritoneal visualization was achieved by insufflating air into the abdomen using sphygmomanometer bulb. The problem with using air insufflations is that, the nitrogen present in the air diffuses through the peritoneum and reaches the blood.

Air pneumoperitoneum is more painful than nitrous oxide pneumo peritoneum but less painful than carbon di oxide pneumoperitoneum. Subsequently carbon di oxide and nitrous oxide are used for insufflating the abdomen.

Setting of operating room

Appropriate training of theatre technician in setup, use and trouble shooting of the equipments is necessary in laparoscopic surgery. The setting of laparoscopic operating room is depending upon the procedure being done.

It is important to come early to theatre to ensure proper setup and confirm that all instruments are available and working in good condition. Spending the

time in placing the equipments and positioning the patient in operating table is the secret of success in completing the procedure.

Positioning of equipments and team

Appropriate position and orientation of operating room is depending upon the procedure. Following things to be considered in laparoscopic surgery,

- Position of the surgeon
- Number of assistants
- Staff nurse
- Monitors position - Surgeon, ports, video image all must be in the straight line.
- Instrument trolley
- Anesthesia trolley etc.,

Checklist

Instrument checklist helps to ensure that all items are available and it decreases the operating time.

Following instruments and equipments will be needed for any laparoscopic procedure. Additional instruments may be needed in some advanced laparoscopic procedure.

- ✓ Electric operative table
- ✓ Anaesthesia monitor and equipments
- ✓ Light source
- ✓ Insufflators
- ✓ Two video monitors
- ✓ Video recorder
- ✓ Camera processor unit
- ✓ C – Arm
- ✓ Suction irrigators
- ✓ Diathermy units

Instrument table contains

- BP handle, no.15 blade
- Hasson’s cannula or Veress needle
- Tube for gas insufflations
- Fiberoptic cable
- Video camera

Figure .3 INSUFFULATOR

Figure .4 **LIGHT SOURCE**

- Diathermy cable
- Hemostats
- Trocars and cannula
- Atraumatic grasper
- Toothed grasper
- Needle holder
- Curved, straight dissectors
- Bowel holding forceps
- Babcock forceps
- Scissors
- Fan retractor, curved retractor
- Biopsy forceps
- Trucut biopsy
- Hook dissector
- Spatula type dissector
- Ball tipped coagulator
- Ultrasonic scalpel (optional)

Figure.5 **CAMERA**

Figure.6 **0 DEGREE AND 30 DEGREE, 10 MM TELESCOP**

- Endocoagulator probe (optional)
- Haemostatic clip applicator
- Endo stapler
- Endo suture
- Endo loop

Basic room setup

Reassess the configuration of position of the operating table and instruments. There should be two full CO2 cylinders one for procedure another one as a spare.

Assure the following details before starting the procedure,

- Table tilt mechanism
- Leg support and safety strap
- Check the position of X-ray cassette plate
- Availability of radiology technician
- Ensure Foley's catheter and Ryle's tube in place
- Check for insufflator's alarm

- Check the irrigation fluid container
- Check the diathermy unit and proper grounding pad
- Before starting the procedure connect the light cable and camera to the laparoscope and focus the laparoscope and white balance it.
- Check the Veress needle for spring action and patency of needle channel.
- Check the all stopcock in the cannula.
- Check for cracks in the rubber washer
- Check for handle and jaw movements of the instrument

Trouble shooting

Laparoscopic procedures are inherently complex. Any time surgeon may be in trouble in proceeding the procedure. In that condition surgeons should be adequately familiar with instrument to solve the problem.

Problem	**Cause**
Poor insufflations	Empty CO_2 cylinder Sealing cap leakage Opened stopcock in accessory port

	Insufflators tube loose connection Loose Hasson's stay sutures
Excessive insufflations pressure	Veress needle not in the peritoneal cavity Inadequate muscle relaxation Kinking of the insufflations tube
Inadequate lighting Too bright lighting	Bulb is burnt out Loose connection Light is on minimal power Damage in the fiberoptic Low brightness in monitor Light is on maximum mode High brightness in monitor Light source boost activators
Picture not depicted in the monitor	Components of camera control unit not switched on. Connectors between the monitors and camera control units not inserted properly.

Poor quality picture	Condensation on the lens of cold scope while entering the warm abdomen. Incorrect focus, cracked lens, internal moisture.
Problem in suction irrigation	Kinking of tube. Block in the suction irrigation cannula. Less pressure in irrigation container.
Problem in diathermy	Diathermy not grounded properly Foot pedal not connected. Connection between the diathermy unit and diathermy tip not secured.

Preoperative evaluation

Routine cardiac and respiratory evaluation is mandatory in all laparoscopic surgery. It is affected by pneumoperitoneum, CO2 absorption and volume shift due to patient positioning.

Primary factor affecting the hemodynamics

Laparoscopic exposure method

- CO_2 pneumoperitoneum
- Other gases like N_2O

Position of the patient

- Reverse trendelenburg
- Trendelenburg

Secondary factor affecting the hemodynamics

- Patient status
- Age
- Co-morbidity
- Acute illness
- Chronic illness
- Volume status
- Medications
- Duration of the surgery

Positioning the patient

- Lithotomy position may produce femoral or peroneal neuropathy. It may also produce exacerbation of lower limb ischemia.

- Trendelenburg position may produce decrease pulmonary reserve, increase airway pressure and gastro esophageal reflux.

Trocar site complication

It may produce,

- Bowel injury
- Bladder injury
- Vascular injury
- Incisional hernia

Bowel injury

Most frequently involves the small intestine, followed by colon, duodenum and stomach. It may be unrecognized and present as peritonitis in post op period. Mortality is 5%. It is usually caused by Veress needle or trocar placement. It repairs either laparoscopically or open method. It is preventable, it occurs mainly because of the carelessness and overconfidence.

Control of port site bleeding

It can be achieved by following methods,

- Compression by trocar

- Appling Foley's catheter balloon temporarily
- Coagulation
- Suture ligation
- Laparotomy as a last option

Vascular injury

Usually rare, it may occur in pelvic surgery. Distal aorta, inferior vena cava and iliac vein may involve. Veress needle enter into the major vessel can be identified by aspirate the blood in the needle. Repair with Direct suture ligation or synthetic graft may require.

Incisional hernia

It is a rare complication occurs in laparoscopy surgery. A large 10 mm port has the high risk of hernias. Bowel or omentum may trap in the defect on the 3rd or 5th post operative day.

Incidence of incisional hernia following laparoscopic surgery is approximately 0.05%. Entering the abdomen by trocar with angulations can minimize the hernia because weakening point will not be in the centre of the ports. The hernias can be minimized by suturing the fascia by figure of eight by 10mm or large port.

Bladder injury

It may result from the low Veress needle placement or low abdominal trocar. Chances of bladder injury may be increased by previous abdominal surgery, previous bladder surgery or congenital anomalies. Appearance of blood or gas in the urobag indicates the bladder injury. Routine preoperative catheterization by Foley's in all laparoscopic surgeries can help to reduce the bladder injury.

Wound infection

Wound infection following laparoscopic surgery is rare. Wound abscess, cellulitis and necrotizing fasciitis may occur due to contamination of infected tissues like inflammed gallbladder or appendix in the subcutaneous plane.

Judicious use of antibiotic can prevent this complication. Proper rinsing of instruments in the normal saline after taken up from the gluteraldehyde solution can prevent chemical suppuration.

Diathermy injury

Monopolar electrocautery is safe and economical. But problem by electrocautery is thermal injury to viscera due to break up of insulation of instrument or unintended contact of active electrode with other metal of abdominal wall.

Port site metastasis

We should be very much careful in retrieving malignant lesion through the incision. Protective sheath can be used to avoid tumor cell implantation while specimen extraction. Gasless laparoscopy may avoid the systemic dissemination.

Applications of diagnostic laparoscopy

- To find the etiology for undiagnosed chronic abdominal pain.
- To evaluate acute abdominal pain.
- To evaluate blunt and penetrating abdominal injury.
- To analyze hepatic disease and ascites.
- To stage the abdominal malignancy like gastric, hepatic, pancreatic, colonic, intestinal, ovarian malignancy and lymphoma.
- To obtain tissue for histopathological diagnosis.
- To review the response of neo adjuvant or adjuvant therapies [(4).]

General contraindications for laparoscopy

- Bleeding diathesis
- Coronary artery disease-severe
- Congestive heart disease

- Abdominal wall infection
- Bowel distension

ROLE OF DIAGNOSTIC LAPAROSCOPY IN ABDOMINAL MALIGNANCY

Currently, diagnostic laparoscopy combines with other imaging modalities, is very useful to differentiate the benign and malignant disease and to assess the metastatic spread in the abdomen and also helps to stage the disease.

Diagnostic laparoscopy aids to assess the operability of the abdominal malignancy, particularly hepatic malignancy, pancreatic, gastric and colon malignancy.

Indications for laparoscopy in abdominal malignancy

- Preoperative assessment for major curative surgery
- Appropriate analysis for hepatic and nodal metastasis
- Confirmation of the imaging studies
- For ascitic fluid analysis
- Therapeutic decision for Hodgkin's lymphoma [9]

Contraindications for laparoscopy in abdominal malignancy

- Cure or palliative open procedure is clearly indicated
- Laparoscopy unlikely to alter the plan of the treatment
- Radiological finding suggests that difficult to access the disease region
- Potentially resectable tumor which needs referral to higher centers

Important steps in diagnostic laparoscopy in abdominal malignancy

- Thorough abdominal and pelvic survey
- Division of gastrohepatic omentum
- Biopsy using cupped forceps from the suspected lesion
- Ascitic fluid retrieval for cytology and culture
- Peritoneal lavage for malignant cells
- Lymph node biopsy
- Laparoscopic ultrasound [9]

Laparoscopic ultrasound

Diagnostic laparoscopy is to improve the preoperative staging which can be used to decide the resectability and curability of tumor. But loss of tactile

sensation and 3 Dimensional visualization are the main disadvantages of the laparoscopy which can be compensated by laparoscopic ultrasound.

Laparoscopic ultrasound also allows to differentiate solid tumor from the cyst and also used to take guided biopsies from the lesion. Before proceeding of the curative surgery, local extent of the tumor, lymphatic and hepatic metastasis can be accurately diagnosed by laparoscopic ultrasound which has more specificity than conventional ultrasound.

Following ultrasound equipments are required,

- Real time, B – mode ultrasound unit
- Flexible ultrasound probe
- Linear or convex array system
- Electronic split screen imaging monitor

Particularly laparoscopic staging combined with laparoscopic ultrasound is very much useful in hepato-biliary and pancreatic malignancy.

The addition of laparoscopic ultrasonogram appears to extent the accuracy of laparoscopic staging from 15 to 20%.

Malloy et al. evaluated 244 patients of esophagus or gastric cardiac malignancy patients without metastasis were screened by endoscopic ultrasound, CT scan, diagnostic laparoscopy and laparoscopic ultrasound. Out

of that 165 patients with adenocarcinoma had distal metastasis which was diagnosed by above said modalities.

And reported that diagnostic laparoscopy and laparoscopic ultrasound had 96% sensitivity, 100% specificity, 100%accuracy and concluded these modalities excluded 38% of patients from unnecessary celiotomy.

ROLE OF DIAGNOSTIC LAPAROSCOPY IN ACUTE ABDOMEN

Laparoscopy is an alternative to explorative laparotomy in case of acute abdomen not only diagnostic but also a therapeutic.

Indications for laparoscopy in acute abdomen

- Acute abdominal pain
- Abdominal trauma
- Second look in specific condition

Various causes for acute abdominal pain according to site of involvement

- Right iliac fossa pain
  - ✓ Acute appendicitis
  - ✓ Tuberculous caecum and ileum
  - ✓ Small bowel obstruction by bands

- ✓ Omental adhesions
- ✓ Meckels' diverticulitis
- ✓ Carcinoma caecum
- ✓ Amoeboma

❖ Periumblical region

- ✓ Small bowel obstruction (adhesion)
- ✓ Appendicular abscess
- ✓ Pancreatitis
- ✓ Tuberculous ileum
- ✓ Mesenteric ischemia
- ✓ Torsion greater omentum
- ✓ Meckels diverticular abscess
- ✓ Lymphoma
- ✓ Mesothelioma
- ✓ Rectal gangrene
- ✓ Ileal perforation due to typhoid

- ❖ Right upper quadrant pain
  - ✓ Duodenal perforation
  - ✓ Subhepatic appendicitis
  - ✓ Infected hydatid cyst
  - ✓ Rupture liver abscess
  - ✓ Acalculus cholecystitis
- ❖ Pain of gynaecological origin (pelvic)
  - ✓ Torsion ovarian cyst
  - ✓ Rupture ectopic pregnancy
  - ✓ Infected dermoid cyst- retrorectal
  - ✓ Pelvic abscess

Chronic pelvic pain is a debilitating problem common in reproductive and old age women, which is defined as continuous or intermittent lower abdomen or pelvic pain for at least six months not related to menstruation, intercourse and pregnancy.

Diagnostic laparoscopy is considered as gold standard to establish the diagnosis in chronic pelvis pain when other investigations fail. Studies show

endometriosis found in 33% and pelvic adhesion in 24% of patients but no pathology was made out in 33% to 50% of the patients.

Causes for chronic pelvic pain

- Gynecological
  - Pelvic inflammatory diseases
  - Endometriosis
  - Adenomyosis
  - Pelvic venous congestion
  - Leiomyomata
- Gastrointestinal
  - Inflammatory bowel disease
  - Irritable bowel syndrome
  - Diverticular disease
  - Chronic constipation
  - Adhesion
- Urological
  - Chronic urethritis

- Uretheral diverticulum
- Detrussor overactivity
- Interstitial cystitis

❖ Skeletal

- Spondylolisthesis
- Lumbar disc disease
- Osteitis pubis
- Scoliosis

❖ Myofascial

- Muscle spasm
- Nerve entrapment
- Fasciitis
- Hernias

❖ Psychosocial

- Depression
- Somatisation
- Psychosexual dysfunction [11]

Various therapeutic laparoscopic procedures have been used to treat chronic pelvic pain, they are:

- Adhesiolysis
- Endometriosis ablation
- Hysterectomy
- Ovarian cystectomy
- Ooporectomy
- Presacral neurectomy
- Excision of persistent omphalomesentric ligament
- Appendicectomy [12]

ROLE OF LAPAROSCOPY IN CHRONIC ABDOMINAL PAIN

Even though laparoscopy is useful in the various aspects, the role of diagnostic laparoscopy is tremendous in chronic abdominal pain. More than 40% of the cases the specific etiology for chronic abdominal pain remains undiagnosed by our routine physical, laboratory and imaging. In this situation laparoscopy plays an important role in arriving the appropriate diagnosis and also for intervening it.

Chronic abdominal pain is defined as intermittent or continuous pain in the abdomen more than 3 months duration [4].

Pain perception is varying from individual to individual and it mainly depends upon,

- Anatomical lesion
- Local release of biochemical substance from the lesion
- Psychological factor
- Pain threshold of the patients [6]

It can be broadly classified into

- Functional gastrointestinal disorder
- Organic disorder related to anatomic abnormality, inflammation and tissue damage.

Functional gastrointestinal disorders

Functional gastrointestinal disorders are group of disorders characterized by chronic and recurrent abdominal pain due to altered GI motility or visceral hypersensitivity or autonomic dysfunction. It can be associated with physical stress or psychological stress usually affects children and adolescent.

It can be further sub divided into

- Functional abdominal pain
- Irritable bowel syndrome
- Aerophagia
- Functional dyspepsia
- Abdominal migraine

Functional gastrointestinal disorders should be distinguish from organic causes of chronic abdominal pain on the basis of the history , physical examination and simple screening laboratory test. Tricyclic antidepressant or selective serotonin reuptake inhibitor (SSRI) can be used to treat the functional abdominal pain syndrome.

Etiology for organic causes of chronic abdominal pain

Various causes of chronic pain commonly associated with dyspepsia are

- Gastroesophageal reflux disease
- Peptic ulcer disease
- Billiary tract disease like cholelithiasis
- Gallbladder dyskinesia- acalculous billiary colic which is associated with delayed emptying of gallbladder

- Chronic pancreatitis
- Gastroparesis
- Chronic hepatitis

Various causes of chronic pain associated with altered bowel pattern are,

- Lactose intolerance –associated with crampy pain, diarrhea, flatulence and belching
- Inflammatory bowel diseases- manifested as poor growth, anaema, bloody stools, arthritis, iritis, hepatitis and erythema nodosum.
- Celiac disease
- Colitis
- Constipation associated disorders like encopresis, megacolon
- Infection caused by giardia lamblia, blastocystis hominis, clostridium difficile, yersinia and campylobacter

Various causes of chronic pain associated with paroxysmal abdominal pain are

- Musculoskeletal pain : costochondritis, myositis, and abdominal wall muscle strain
- Obstructed viscus: bowel obstruction caused by adhesions and volvulus

- Ureter obstruction:caused by kidney stones results in colicky pain

Other conditions associated with recurrent abdominal pain

- Capsular distension
    - Hepatomegaly, spleenomegaly
- Referred pain
    - Due to lower lobe pathology like pneumonia
    - Spinal cord tumor or discitis which is an uncommon cause
- Systemic conditions
    - Diabetic ketoacidosis
    - Sickle cell crisis
    - Hereditary angioneurotic edema – may occurs without cutaneous or oropharyngeal edema
    - Polyarteritis nodosa
    - Lead intoxication
    - Acute intermittent porphyria

In spite of thorough history, physical,laboratory and specific examination, to arrive the accurate diagnosis and etiology of chronic abdominal pain remain challenge to the surgeons

Diagnostic laparoscopy is the last resort of investigation when other modalities fail to diagnose.

Most common finding in diagnostic laparoscopy includes adhesions, appendicular pathology, hernias, endometriosis, ovarian pathology and abdominal tuberculosis [4].

APPENDICITIS- laparoscopic approach

Several randomized, prospective clinical studies of laparoscopic appendicectomy to open appendicectomy clearly show the feasibility and safety of laparoscopic procedure.

Laparoscopic approach allows for comparable or shorter length of hospital stay and complication rates when compared to open appendicectomy. Indications for laparoscopic appendicectomy includes patient with right iliac fossa pain with atypical presentation, women of reproductive age group, obese patient and those patients participated in strenuous activity.

Bryson demonstrated diagnostic laparoscopy in 55 women with chronic abdominal pain localized to the right lower quadrant and reported that 12 had chronic appendicitis 5 had endometriosis 38 had adhesions.

In the follow up for 2 years, 44 were pain free, 9 were improved and 2 who had endometriosis were not feel better. These results conclude that in patients with chronic abdominal pain, appendix must be carefully evaluated and he suggested that laparoscopic appendicectomy may sometimes be a useful procedure with persistent right lower quadrant pain.

ADHESIONS- laparoscopic approach

Intra abdominal adhesions are major clinical entity and also a common problem. It usually occurs as a result of injury to the peritoneum in the form of surgery or infection. Incidence of adhesions following laparatomy is 95%. Most of the patients with intra abdominal adhesions do not have any problem. But some patients develop chronic adhesion relative disorders like chronic abdominal pain.

Clinical problems related to adhesions are,

- Small intestinal obstruction
- Chronic abdominal pain
- Secondary infertility in females
- Ectopic gestations
- Difficult reoperation

Acute appendicitis and appendicectomy are major causes for adhesions. In women, previous hysterectomy is the commonest cause for post operative adhesive intestinal obstruction.

A retrospective study is based on the Scottish National Health Service medical record linkage data base was published in 1999 regarding intra abdominal adhesions. They followed the patients who underwent open abdominal and pelvic surgery for 10 years and stated that 5.7% of all re-admissions due to adhesions related problem and 3.8% required reoperation.

Vafa, Cloudine and Philip said in their studies that an overall 77.8% improvement in symptoms following laparoscopic adhesiolysis in patients with chronic abdominal pain, bowel obstruction or both. [21]

Various operating techniques in adhesiolysis are

- Scissor dissection
- Electro dissection
- Harmonic scalpel
- Laser surgery
- Aqua dissection
- Suturing

Scissors dissection

Blunt or round tipped, sharp cutting edge 5 mm scissors with one fixed and one moving blade are used to release the bowel adhesion. Sharp dissection primarily used for avascular adhesions. Electro surgery and laser surgery are usually reserved for where the vascular adhesions are anticipated.

Electro surgery

Mono polar electro surgery should be avoided on the bowel. Bipolar instruments can be used to dissect the adhesions close to the bowel.

Harmonic scalpel

It is very useful where extensive or vascularised adhesion present. The advantage of harmonic scalpel over electro surgery is lack of electrical energy and less lateral thermal energy spread.

Suturing

Every surgeon should have the experience in laparoscopic knotting because bowel injury can happen in adhesiolysis which can be managed by intra corporal suturing.

ABDOMINAL TUBERCULOSIS-laparoscopic approach

Abdominal tuberculosis comprises tuberculous infection of gastro intestinal tract, peritoneum, omentum, mesenteric lymph nodes and solid organs like liver, spleen.

TB abdomen is the commonest form of extra pulmonary tuberculosis.

Gastro intestinal tuberculosis forms 1% of hospital admissions in India and accounts for 2/3 of abdominal tuberculosis. The incidence of abdominal tuberculosis in worldwide is 8 to 10 million and causes 3 million deaths.

If it is caused by ingestion of contaminated food by mycobacterium tuberculosis then it is called primary intestinal tuberculosis. If it is caused by swallowing of infected sputum it is called secondary tuberculosis.

Symptoms of abdominal tuberculosis are**,**

Abdominal pain	86%
Fever	61%
Anorexia	48%
Vomiting	46%

Abdominal distension, ascites	37%
Borborygmi, abdominal mass, diarrhea, constipation	<35%

Classification

1. Peritoneal tuberculosis

   i. Acute

   ii. chronic

   Ascitic type – generalized or localized

   Fibrous type – adhesive, plastic, military nodule

   Peritoneal folds – mesenteric adenitis, cysts, adhesions, abscess, omental.

2. Gastro intestinal tuberculosis

   i. Ulcerative

   ii. Hyperplastic

   iii. Fibroptic

3. Solid organ tuberculosis

   i. Liver

ii. Spleen

iii. Gall bladder

iv. Common bile duct

v. Pancreas

Organ involved	**Incidence**
Peritoneum	37.6%
Small bowel	27%
Ileocaecal	22.9%
Colon and rectum	9.2%
Mesenteric lymph node	6.2%

Laparoscopy is diagnostic in 92% of patients with abdominal tuberculosis. The advantage of laparoscopy in abdominal tuberculosis is histological confirmation of the disease and it is the most specific diagnostic test.

The morbidity of laparoscopy is very much less and complication rate is <5%. If patients have the relevant background and clinical history, laparoscopy is the investigation of choice in abdominal tuberculosis.

In abdominal tuberculosis, rate of accurate clinical diagnosis is only 39.6%, further many patients are misdiagnosed as abdominal tuberculosis. So laparoscopy is the only way to prove or disprove this condition.

ENDOMETRIOSIS-laparoscopic approach

Laparoscopy can be used to diagnose and to treat the endometriosis which is one of the cause for chronic abdominal pain. Laparoscopic treatment of endometriosis can be either conservative or radical.

Conservative surgery preferred to retain the fertility of the patients. However same surgery for endometriosis involved dissection of urinary tract, bowel tissues around the vagina and rectum.

A wide range of laparoscopic procedure can be done for endometriosis. These include treatment of peritoneal lesion, ovary, intestine and urinary tract endometriosis.

Two approaches have been proposed for ovarian endometriosis. These are fenestration and excision. Simply open the cyst and irrigate thoroughly is known as fenestration. Excision or destruction by coagulation or laser treatment sometimes needed for this kind of ovarian endometriosis.

In past, intestinal endometriosis can be managed by conventional techniques. But in the advent of laparoscopy, it can be managed laparoscopically.

The efficacy of laparoscopic approach for the diagnosis and treatment of severe endometriosis has been thoroughly evaluated in literatures. Superficial implants can be treated by simple excision. Laparoscopic approach is safe and effective method for the treatment of early as well as advanced urinary tract endometriosis.

Presacral neurectomy that means division of specific affected pelvic nerves by laparoscopic ally is used as a last resort in the treatment of intractable endometriosis associated with pelvic pain.

Many studies compared laparoscopy verses conventional laparotomy in the treatment of endometriosis which reveals laparoscopy causes less postoperative adhesions and less impairment of reproductive function compared to laparotomy.

The overall diagnostic accuracy of laparoscopy is 99% for acute abdominal pain, 70% for chronic pain syndrome, 95% for focal liver disease, 95% for abdominal masses, 97% for ascites, 80% for retroperitoneal disease[13].

Even some patients having normal finding in laparoscopy they got some amount of pain relief because of placebo effect.

NEW EVOLUTION OF MINIMAL ACCESS SURGERY

Hand assisted laparoscopic surgery (HALS)

Most of the surgeons limit themselves to basic laparoscopic surgery. The main limiting factors that prevent the widespread development are lack of tactile sensation, impaired hand eye coordination, inadequate exposure, lack of normal celioscopic vision.

So the laparoscopic surgeons and engineers develop a new field called Hand Assisted Laparoscopic Surgery. This modality can be effective to regain the confidence of surgeon by feel the direct tactile sensation and eye coordination. Even though there are various indications for HALS the most promising ones are colectomy, splenectomy and live donor nephrectomy.

The main evolution of HALS is to start with surgeons inserted gloved hands through mini incisions and maintained the seal between the wound edges and surgeon's hand . There are various devices to maintain this.

Types of HALS devices

Device connected to abdomen by adhesive flange	Dexterity device Intomit

Kissing balloon principle	Hand port device
Single piece device	Lap disc Omni port

Evolution of HALS

- Hand assisted spleenectomy
- Hand assisted laparoscopic colorectal surgery like colectomy
- Hand assisted gastro esophageal surgery like bariatric surgery, gastrectomy and esophagectomy
- Hand assisted nephrectomy
- Hand assisted laparoscopic liver resection
- Hand assisted laparoscopic pancreatic surgery like whipple's

The surgeons can adapt these approaches in initial few cases to perform more complex procedure, learn the techniques and switch over to the total laparoscopic approach after gaining the adequate experience.

Figure .7 HAND ASSISSTED LAPAROSCOPY SURGERY (HALS)

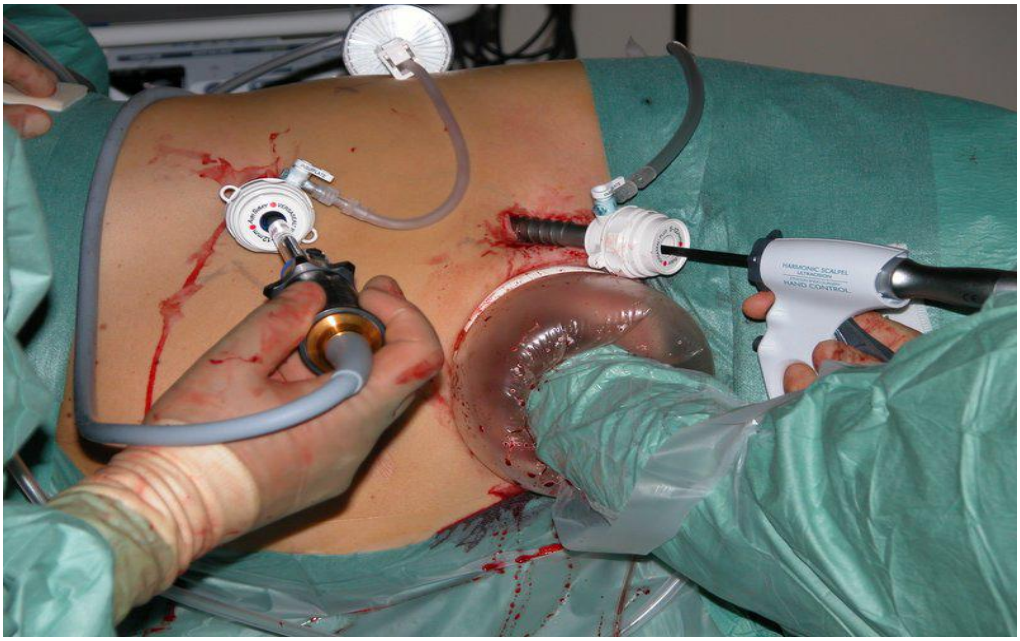


Figure . 8 **SINGLE INCISION LAPAROSCOPY SURGERY (SILS)**

Single Incision Laparoscopy Surgery (SILS)

SILS is an innovation in minimal access surgery can be performed through a single umbilical incision. It is an effective and safe for some procedures like tubal ligation, hysterectomy, appendicectomy, cholecystectomy, sleeve gastrectomy, colectomy and nephrectomy.

The important advantages over other laparoscopic approach are less port site complication, less post operative pain, and less hospital stay. It is also known as “Scarless Surgery”. There by proving popular with some patients.

Once the umbilicus is incised the specialized SILS port with multiple entry sites is introduced into the abdominal cavity and specially designed ergonomic instruments can be used to do the various procedures

Even though SILS is a new innovation of laparoscopic surgery, it is a developing technique and well designed prospective trials are needed to demonstrate the superiority of this technique.

Natural Orific Transluminal Endoscopic Surgery (NOTES)

NOTES is a technique that utilizes the body’s natural orifice like mouth, anus, vagina and urethra to assess the abdominal cavity.

The concept of NOTES is to avoid the complications related to abdominal incision like wound infection, pain, port site hernia and also to minimize adhesions.

Even though it is in the very early stage of development, the literature publish about it is exponential. Various procedures performed via this approach are appendicectomy, cholecystectomy, nephrectomy, colectomy and distal pancreatectomy.

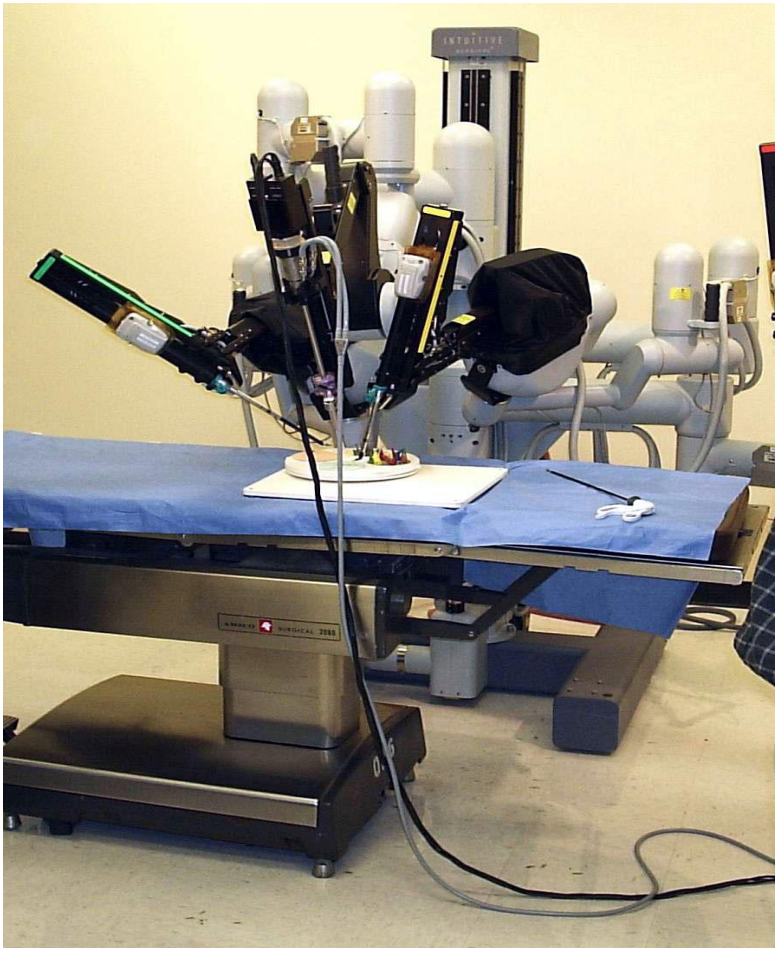
The number of procedures have been done in human is less so the magnitude of morbidity associated with NOTES cannot be estimated

The transvaginal approach is well developed in human and transgastric approach holds future promise. In 2008 Palanivelu et al and Rao et al demonstrated appendicectomy via the NOTES approach through both transgastric and transvaginally.

Some surgeons practiced hybrid variety where the transabdominal or umbilical port used to make the retraction and dissection easy.

Fig .9 Natural Orifice Transluminal Endoscopic Surgery- Transvaginal

Fig .10 Robotic surgery



Robotic surgery

It is defined as surgery performed with the help of the robots. Three major advances aided by surgical robots are,

- ❖ Minimally invasive surgery
- ❖ Remote surgery
- ❖ Unmanned surgery

Advantages of robotic surgery are precision, miniaturization, smaller incisions, decreased blood loss, less pain and less healing time.

In 1985 a robot, the PUMA 560 was used to place the biopsy needle in brain under CT guidance. In 1988, the PROBOT designed at Imperial College London was used to perform prostatic surgery.

The Da Vinci surgical system has three components. These are high-definition 3D vision system, surgeon's console and robotic operating table with arms.

First Robotic pancreatectomy and Wipple's procedures were performed by Prof. Pier Cristoforo Giulianotti , the University of Illinois at Chicago medical team in 2007

In 2008 the same team performed first fully minimally invasive liver resection.

DESIGN, METHODOLOGY, AND TECHNIQUES

This study was conducted in patients presented with abdominal pain more than 3 months whose diagnosis was doubtful or could not be made by our routing physical, laboratory and imaging modalities.

Between September 2011 and august 2012, a total number of 30 consecutive patients with chronic abdominal pain were enrolled in this prospective descriptive cross-sectional study.

They were recruited from the outpatient clinic of General Surgery Department in Coimbatore Medical College Hospital, Coimbatore in the above said study period.

Inclusion criteria

- Age between 15 and 55
- Both males and females
- Abdominal pain more than 3 months

Exclusion criteria

- Known abdominal malignancy patient
- Known psychiatric patient

After getting consent from the patients, they were thoroughly interrogated and examined including per rectal and per vaginal examination and following investigations were done in all patients

- Complete haemogram with ESR
- Blood Sugar, Blood Urea and Serum creatinine
- Stool routine, microscopy and occult blood
- Urine routine and culture
- Plain X-ray abdomen
- X-ray chest
- Ultrasound abdomen and pelvis
- CT abdomen and pelvis
- Upper GI endoscopy
- Colonoscopy

Some patients were subjected to additional investigation according to symptoms, like

- Contrast gastro intestinal series
- Serology for tuberculosis
- Liver function test

After undergoing thorough preoperative evaluation, their intensity of the pain was assessed by using the **Verbal Rating Scale (VRS):** the patient is asked to rate their pain on a five-point scale as **"none, mild, moderate, severe or very severe"**. These patients were posted for diagnostic laparoscopy.

Techniques:

Preparation

Bowel preparation is not usually indicated, but overnight fasting and rectal enema can improve the manipulation and retraction of the bowel and the solid organ which help us to survey the whole abdominal cavity.

Diagnostic laparoscopy is a clean surgery, even though some procedure like biopsy or intervention might be needed, so prophylactic antibiotic was given to all patient.

Graduated elastic stocking was applied to all the patients undergone diagnostic laparoscopy, but deep vein thrombosis prophylaxis like mechanical compression leggings or preoperative heparin was given the high risk patient like age more the 60, previous history of deep vein thrombosis.

Fig. 11 **laparoscopic trolly set up**

Anaesthesia

General anaesthesia was preferred over the region anaesthesia, because some therapeutic interventions might be needed in some cases.

Position

Patient was kept in the supine position and bladder was catheterised with Foley's, Ryles tube was kept to decompress the stomach. Usually operating surgeon was standing on the left side of the patient and assistance also on the same side. Scrub nurse stand in the opposite side to the surgeon with instrument trolley.

Monitor was placed in the foot or head end of the patient according to the site of the abdominal pain.

Fig. 12. **LAPAROSCOPY INSTRUMENT TABLE**

Abdominal access

Abdominal cavity was access by creating the pneumoperitoneum. Both the open (Hasson's) and closed (Veress needle) method was used to create the pneumoperitoneum according to the cases.

If the bowel adhesion is suspected as like the previous history of surgery, Veress needle was inserted in the Palmers point to create the pneumoperitoneum to avoid the inadvertent bowel injury. Open method is a safe method to create the pneumoperitoneum, hence one can visualise the peritoneal cavity before putting the trocar.

We prefer 10 mm camera port in the infra or supra umbilical region, but camera port may vary according to the suspected abdominal pathology.

2 or 3 working ports were made according to the therapeutic intervention as per laparoscopy.

Fig. 13. VERESS NEEDLE TECHNIQUE

Fig. 14. HASSON'S OPEN TECHNIQUE

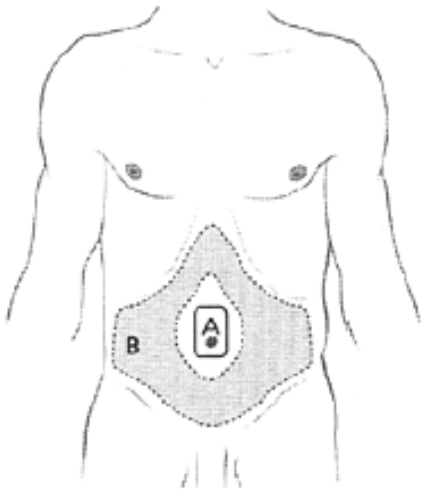
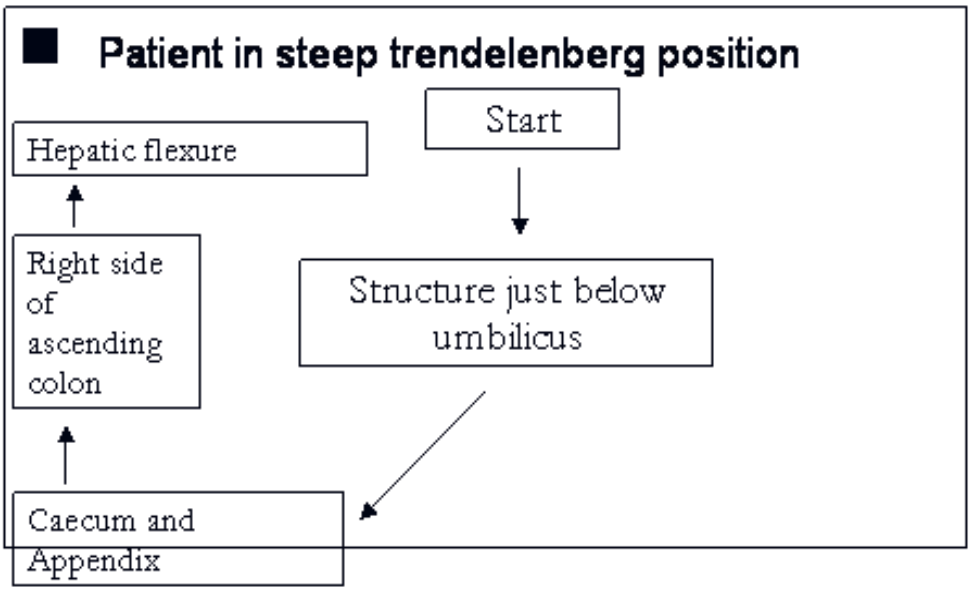


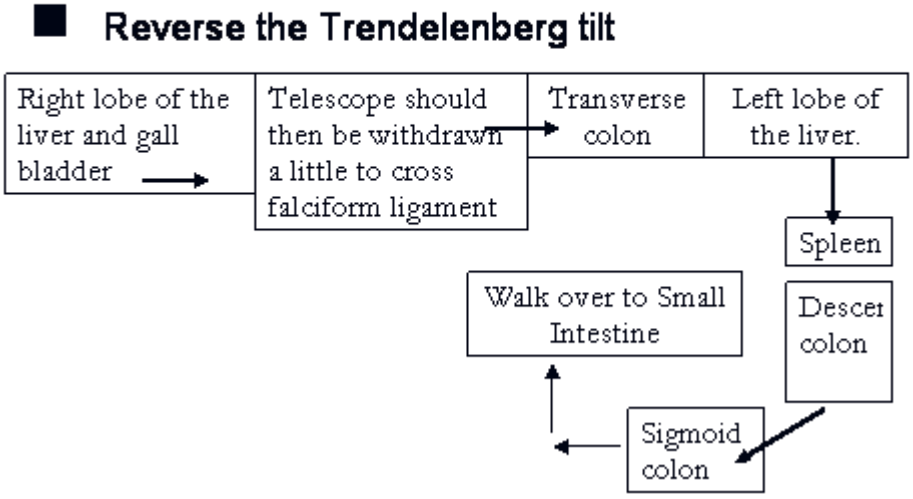
Fig. 87 Position of cannulae for diagnostic laparoscopy. A, Primary 'telescope' cannula; B, secondary 'working' cannulae—exact sites depend on the nature of the procedure.

Fig. 15. PORTS PLACEMENT

Systemic plan of inspection of upper abdomen



Systemic plan of inspection in mid abdomen



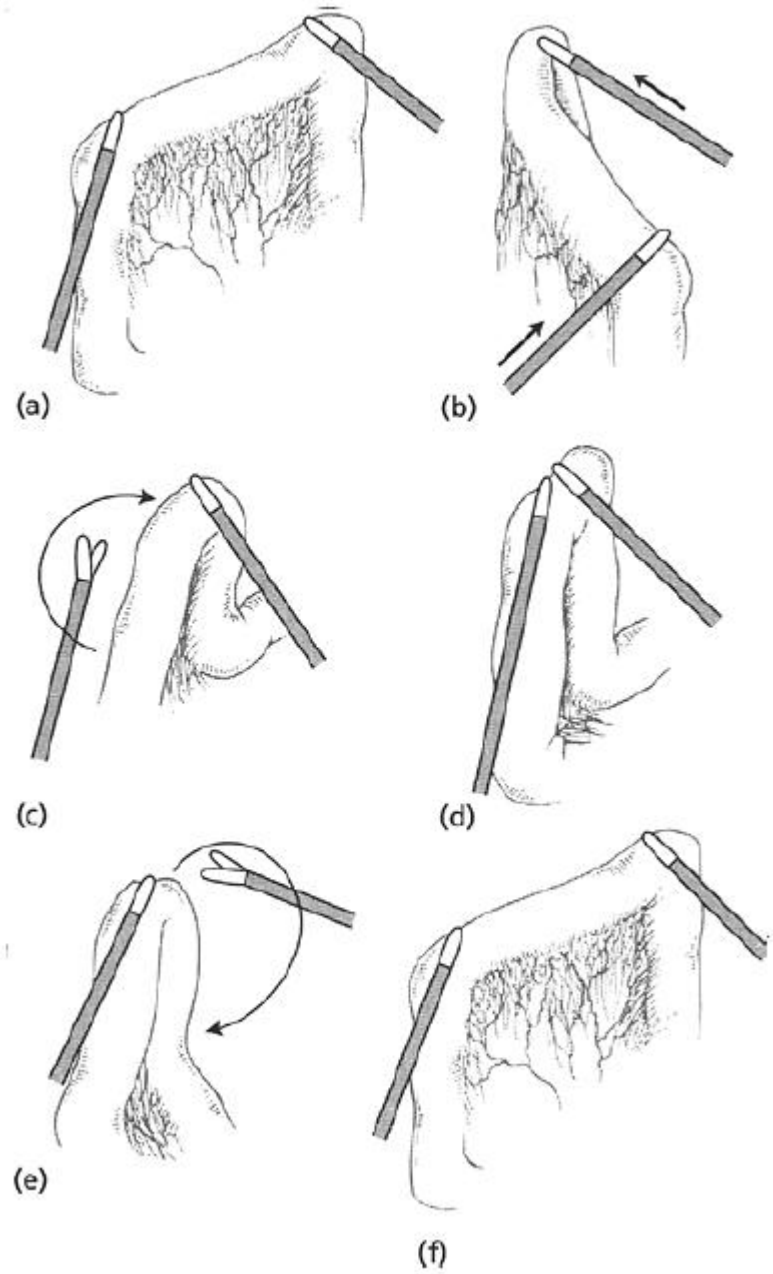
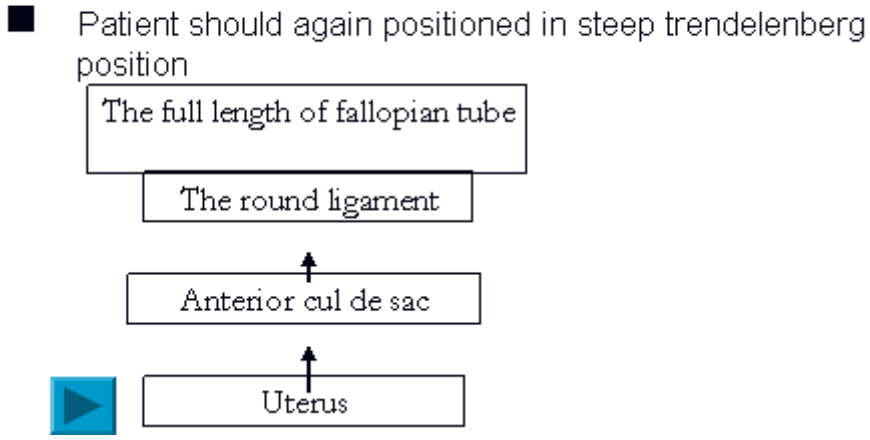


Fig. 88 Walkabout of small bowel. (a,b) Inspect both surfaces of bowel and mesentery; (c,d) release one grasper and re-grasp near the second; (e,f) release second grasper and re-grasp further along the intestine.

Inspection of Pelvis



The whole abdominal cavity will be carefully surveyed. Intrraoperative findings were noted and interventions were planned according to that.

Some interventions like adhesiolysis, appendicectomy, cholecystectomy, mesenteric lymphadenectomy, biopsy, ascitic fluid analysis were done.

In the follow up for 3 months, patients were evaluated for the clinical improvement , degree of pain relief, recurrence and complication.

Data collected from the study were processed and analyse

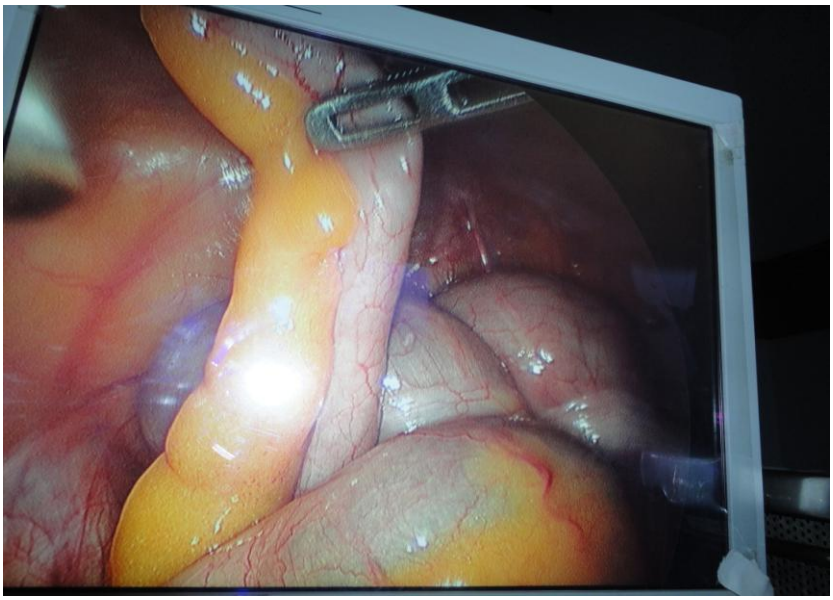


Fig. 16. APPENDICULAR PATHOLOGY

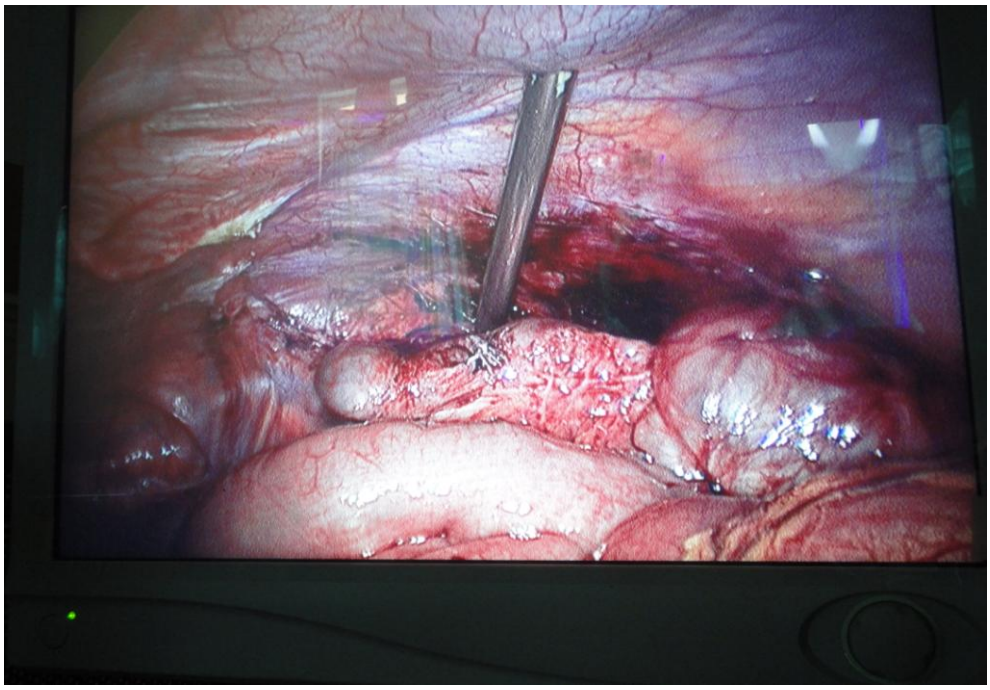


Fig.17.**INFLAMMED APPENDIX ADHERENT TO THE PARIETAL WALL**

OBSERVATION AND RESULTS

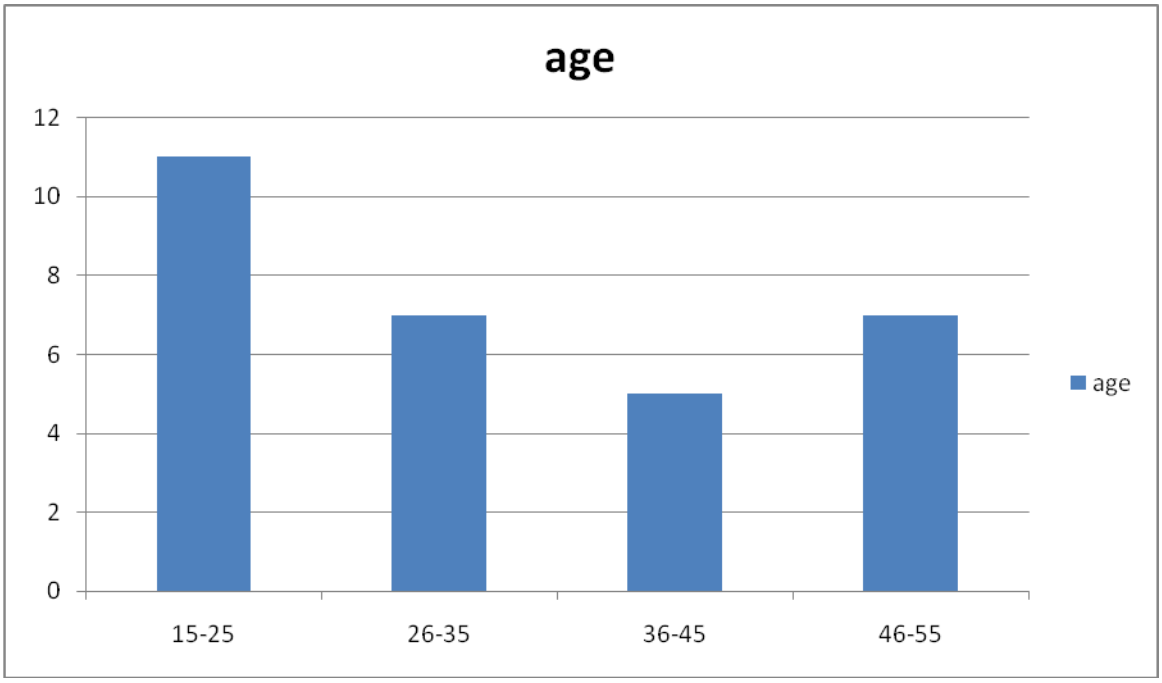
Baseline characteristics of studied patients

AGE DISTRIBUTION

AGE	PATIENT
15-25	11
26-35	7
36-45	5
46-55	7
TOTAL	30

Mean age = 34 years

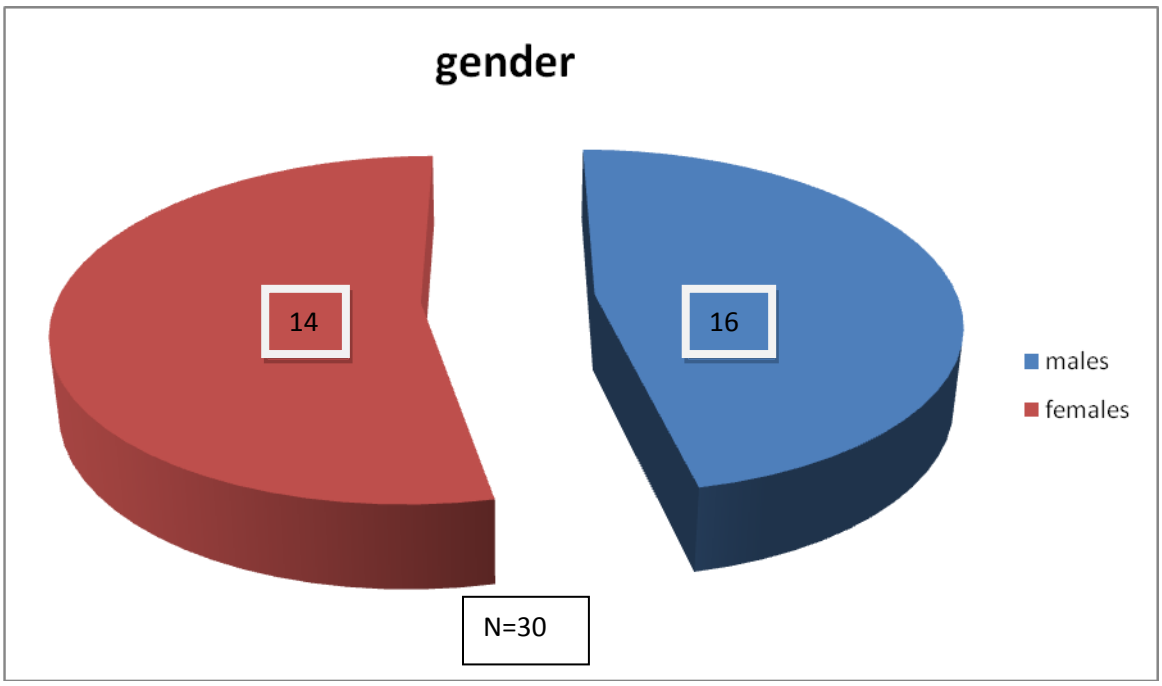
Most of them in the age group between 15-25 in adult population



SEX DISTRIBUTION

GENDER	PATIENT
MALE	14
FEMALE	16
TOTAL	30

- Almost male Vs female ratio is equal in study population..
- Slightly higher in females



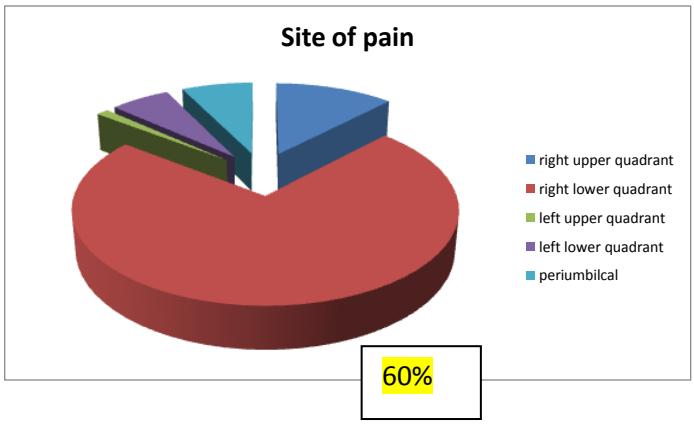
DURATION OF PAIN

Mean = 6 month (3-24 months)

Most of the patients having pain duration around 6 months, not more than 2 years in our study .

SITE OF PAIN

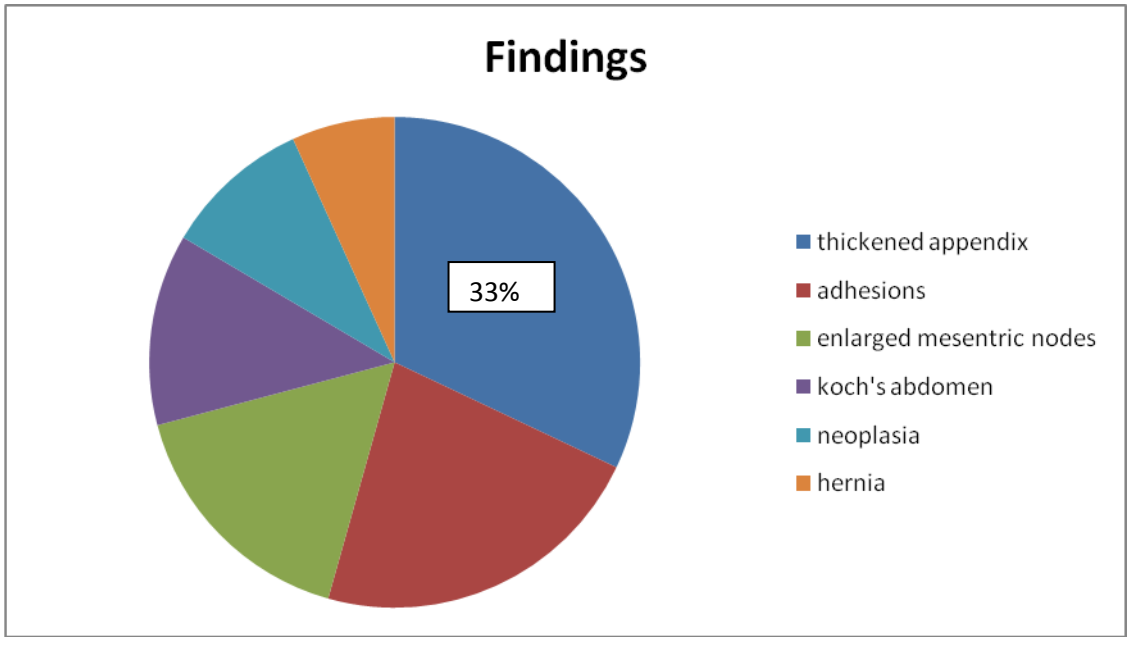
SITE	PERCENTAGE
RIGHT UPPER QUADRANT	3 (10 %)
RIGHT LOWER QUADRANT	**18 (60%)**
LEFT UPPER QUADRANT	1 (3%)
LEFT LOWER QUADRANT	5 (17%)
PERIUMBILICAL	6 (20%)



Most of the patients present with the right lower quadrant pain about 60%, particularly in the right iliac fossa.

Intra operative findings

Findings	percentage
Thickened appendix	**10 (33%)**
Adhesions	7 (23%)
Enlarge mesentric nodes	5 (17%)
Koch's abdomen	4 (13%)
Neoplasia	3 (10%)
Hernia	2 (7%)
No abnoramality	3 (10%)



We found that appendicular pathology is the leading cause for chronic abdominal pain of unrevealed etiology and it is about 33%, followed by adhesion is about 23%.

Laparoscopic appendicectomy was done in all the patients with appendicular pathology like inflamed, thickened appendix and localized adhesion with caceum and abdominal wall. All the histopathological reports of appendix specimen showed the chronic inflammation.

Post operatively they recovered without any complication and all of them were pain free in the follow up of 1 month.

Adhesion was found in 23% (n=7) , out of that 3 patients had the history of previous surgery. One patient underwent open cholecystectomy and other 2 had the history of LSCS. Omentum was adherent to the anterior abdominal wall in the scar region.

2 patients had undergone laparoscopic adhesiolysis, and one of them underwent conversion into open technique because of the extensive adhesion which could not be managed laparoscopically

Other 4 patients who didn't have the history of surgery, had the adhesion of the caecum and appendix to the anterior abdominal wall, laparoscopic adhesiolysis was done in that patients successfully.

Koch's abdomen was diagnosed in 13% (n=4). Intra operative findings were multiple tubercles over the peritoneum, bowel and omentum. In one case we found that flimsy adhesion between the bowel loops and anterior abdominal wall. In all other four cases minimal ascitic fluid was present. Omental and peritoneal biopsy was taken, ascitic fluid was also sent for biochemical analysis. The results confirm the tuberculous abdomen. They all were started anti tuberculous drug post operatively.

Malignancy was diagnosed in (n=3) 10% of the patient. Two patients had metastastic colon malignancy and one patient, HPE proved as a case of mesothelioma and palliative chemotherapy was given to patients.

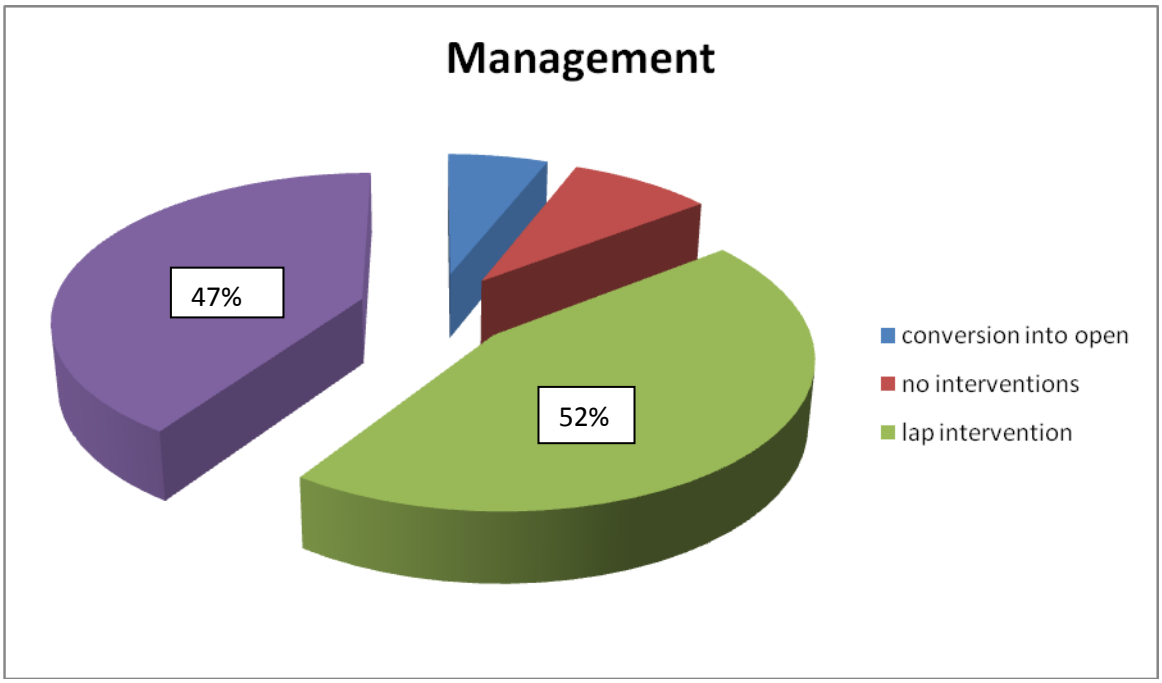
7% (n=2) of the patients had ventral hernia and underwent hernioplasty . One had the small defect in the paraumbical region with omentum adherent to it; another had omental adhesion in the previous LSCS scar,after reduced the content there was a small defect in the corner aspect of the scar region. Mesh repair was done in both the cases.

History of previous abdominal surgeries were found in 4 patients out of which 3 of them had omental adhesion and one presented with small incisional hernia.

Mean operating time for diagnostic laparoscopy alone is 30 minutes but it combined with therapeutic procedures it was 73 $\pm$ 30 minutes.

MANAGEMENT

Lap interventions	16 (52%)
biopsy	14 (47%)
Conversion into open	2 (7%)
No interventions	11 (37%)



Therapeutic procedure was done in 52% (n=16) of the patients which includes appendicectomy 55 %, adhesiolysis 33 %, hernioplasty 11%.

17% (n=5) of the patients had enlarged mesenteric nodes in the terminal ileum which was taken up for biopsy and reports showed the features of non specific adenitis.

No abnormality is noted in 7% (n=2) of the patient that means negative laparoscopy present in our study.

LAPAROSCOPIC INTERVENTION

Lap interventions	Percentage
appendicectomy	10 (55%)
adhesiolysis	6 (33%)
Hernia repair	2 (11%)

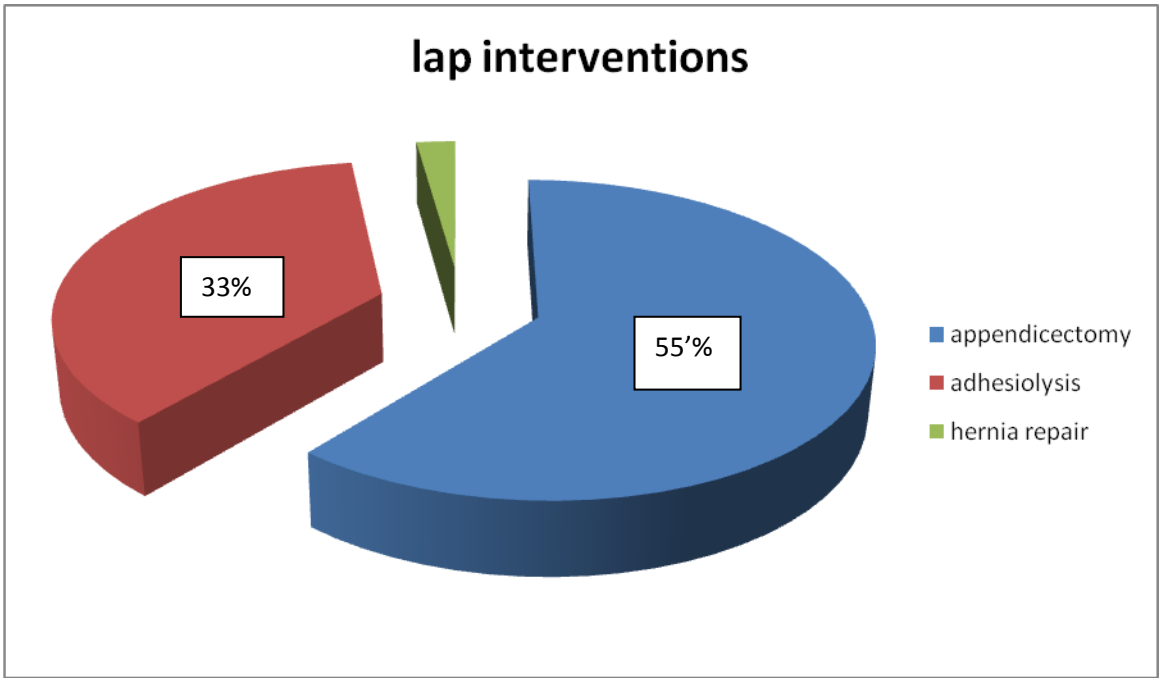


Fig.18. **KOCHER'S SCAR**

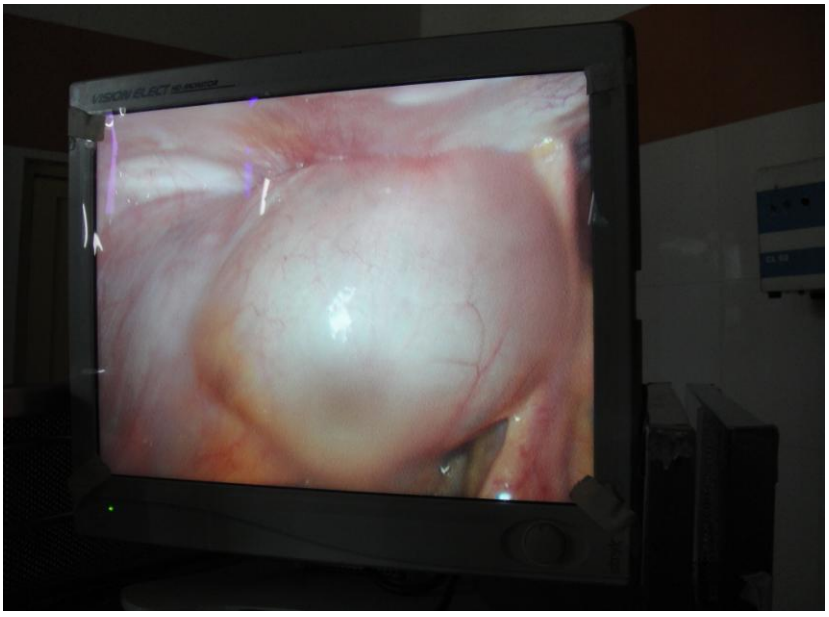


Fig.19. **BOWEL ADHESIONS TO THE KOCHERS' SCAR**

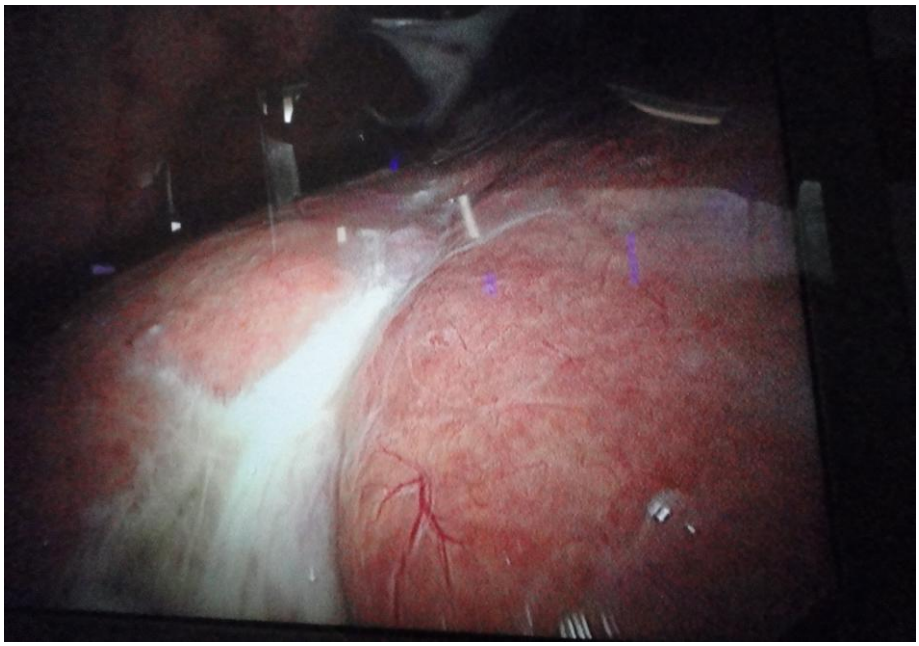


Fig. 20. TB ABDOMEN - FLIMSY ADHESIONS

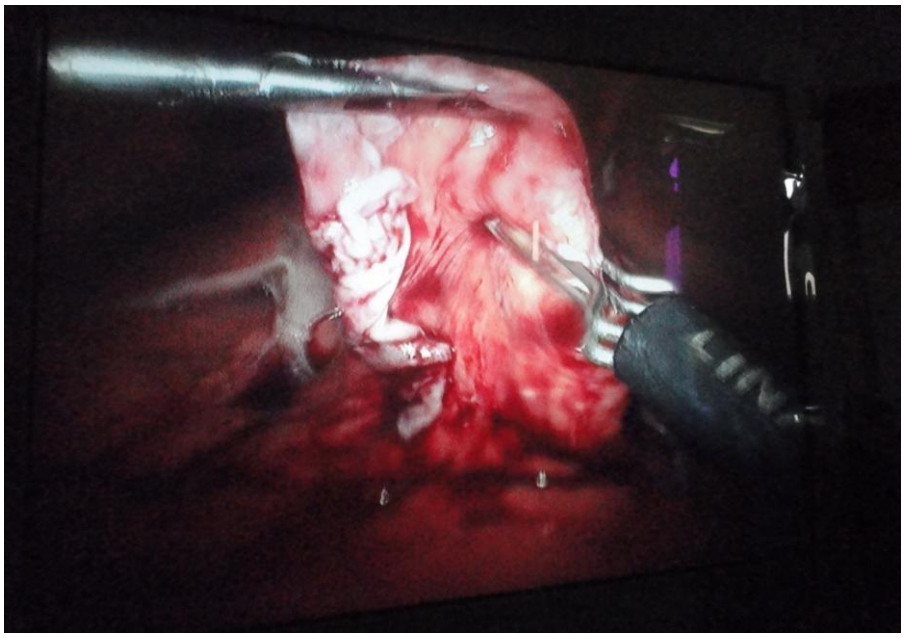
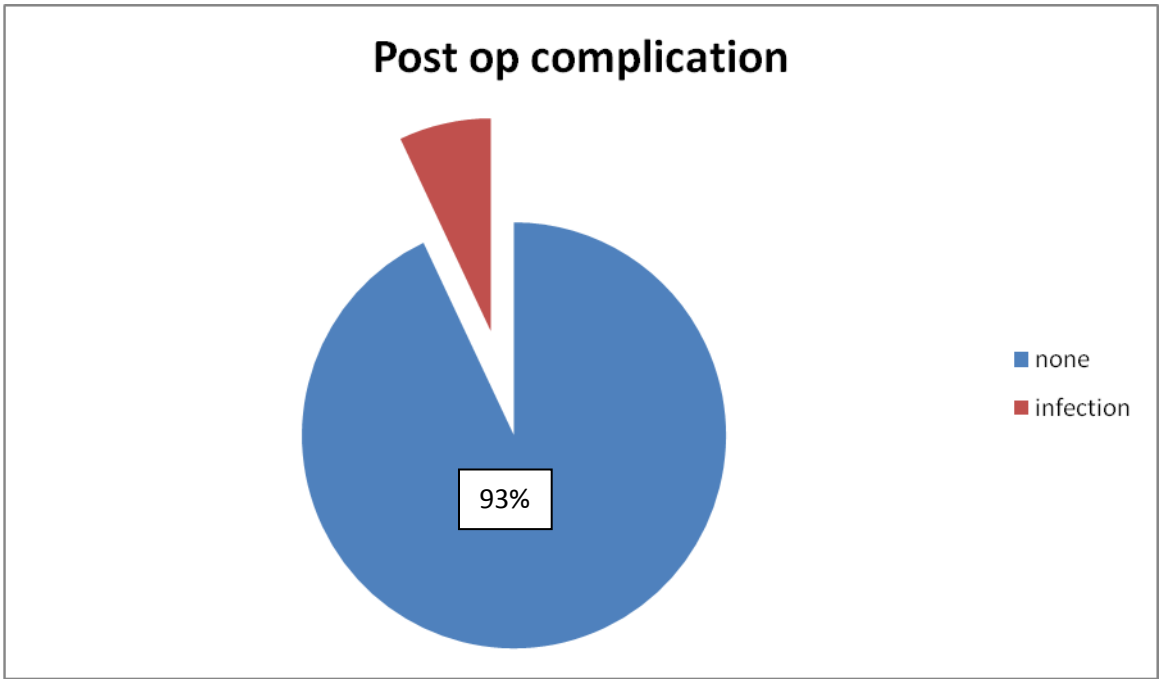


Fig.21. OMENTAL BIOPSY TAKEN FROM THE SAME PATIENT

POST OP COMPLICATIONS

Post op complication	Percentage
None	28 (93%)
Infection	2 (7%)



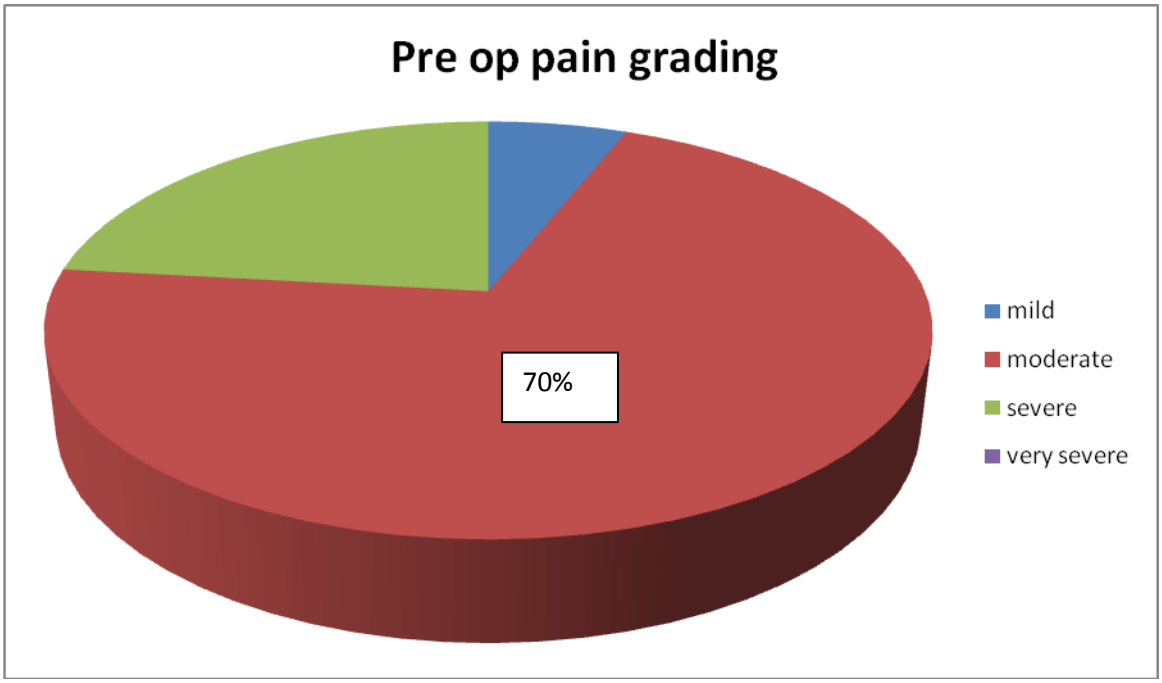
7% (n=2) of the patient had wound infection in the post operative period which was minimal and it was managed by appropriate antibiotics and dressing.

No other major complication was occurred in the intraoperative or post operative period.

Mean Postoperative hospital stay was 2.5 days

PRE OP PAIN GRADING

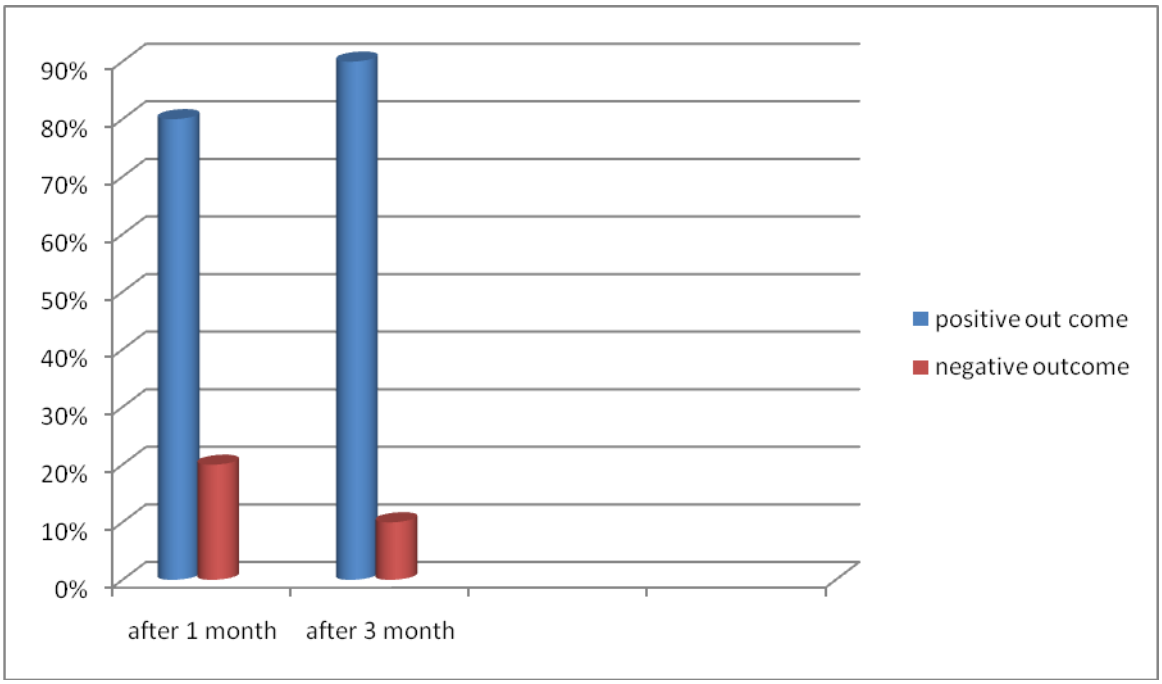
Grading	Percentage
Mild	2 (6%)
Moderate	21 (70 %)
Severe	7 (23%)
Very severe	0 (0 %)



Most of the patient had moderate pain which accounts for 70% (n=21)

POST OP PAIN RELIEF

Duration	Positive out come	Negative out come
After 1 month	80 %	20%
After 3 month	90 %	10%



All patients were observed in the immediate post operative period for pain perception and amount of analgesic were needed to treat. All of them had the follow up in 1st month and 3 rd months. Verbal Rating Scale for pain perception were analysed.

At the end of 1st month 80% patients got complete pain relief and at 3rd month 90% got complete pain relief. In the remaining 10% patient there were no changes in pain grading, it may be because of the disease nature.

And the patient whose laparoscopic findings were normal they also feel symptom free in the follow up. It may be due to placebo effect.

DISCUSSION

Chronic abdominal pain is defined as continuous or intermittent pain in the abdomen more than 3 months duration. Diagnosis and treatment of these patients is usually difficult and frustrating.

It is one of the most common surgical symptoms and most challenging problem facing by the surgeons and physicians.[14].

We evaluated the 30 consecutive patients of chronic abdominal pain with no obvious cause and uncertain diagnosis was evaluated laparoscopically.

Diagnostic laparoscopy revealed normal anatomy and no pathological lesion was found in 7% of the patients. The laparoscopic study of Marana and his coworker [15] and Gowri and Krolikowski [16] who detected that laparoscopy failed to detect any abnormalities in 20% of the patients but in this study

it is 7%.

Common site for chronic abdominal pain is right lower quadrant (60%) followed by periumbilical region (20%).

Common intra operative findings were abnormal appendix (33%) followed by adhesions (23%) which requires appendicectomy and adhesiolysis.

Di Lorenzo and colleagues[17] reported frequency of abdominal adhesions in chronic abdominal pain were 18.6% in their study but it is 23% in

this study. It was found that location of pain in the site of adhesions in 90% of cases, although there was no correlation between extent of adhesion and severity of pain [18]. The pain in the adhesion is due to restrict mobility and distension of the organ particularly bowel.[19]

7 % of patients required conversion into open techniques this is because of the extensive bowel adhesions.

Positive outcome is 80% in the follow up of 1 month and 90% of the patients got complete pain relief in the follow up of 3 months. This figure coincides with Gouda and Emad's [20] study which reports, "the diagnostic laparoscopy yields 80% positive outcome in evaluation of chronic abdominal pain in the follow up of 2 months."

CONCLUSION

The role of diagnostic laparoscopy in chronic abdominal pain is tremendous which increases our knowledge about various underlying abdominal disorders.

Diagnostic laparoscopy can identify abnormal findings and improve the outcome in patients with chronic abdominal pain. However, it should be considered only after a complete diagnostic evaluation has been carried out.

It allows the effective surgical treatment of many conditions encountered at the time of diagnostic laparoscopy.

It is a safe and effective tool to establish the etiology of chronic abdominal pain and allows for appropriate interventions .

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ANNEXURE I

PROFORMA

Name: age: sex: occupation:

Ip no: DOA: DOS: DOD:

Presenting illness:

VERBAL RATING SCALE FOR PAIN

Mild	Moderate	Severe	Very severe

Past history:

Personal history:

Menstrual history:

Examination:

Urine analysis:

Sugar	
Albumin	
Deposits	
Bile salts	
Bile pigments	
c/s	

Blood investigation:

Hb	
TC	
DC	
PL	
ESR	
PS	
Sugar	
Urea	
Creatinine	
Sodium	

Potassium	
mantoux	

Stool examination:

Ova cyst	
Occult blood	

HPE

Peritoneal fluid analysis	
Omental biopsy	
Node biopsy	

Radiological findings:

Chest x ray	
Abdomen x ray	
USG abdomen & pelvis	
CT abdomen & pelvis	
ECG	

Intraoperative findings:

Procedure:

Post operative complication:

Follow up

VERBAL RATING SCALE FOR PAIN

Mild	Moderate	Severe	Very severe

MASTER CHART

S. no	Name	Age	Sex	Ip.no	Duration of pain	Site of pain	Intensity of pain	Intra-op finding	Therapeutic procedure	Post-op complication	Pain relief at 1 month	pain relif at 3 month	Duration of surgery (mins)	H/0 surgery	Hospital stay
1	Patchiappan	55	M	6543	6 mon	Rt upper abdomen	moderate	Cirrhotic liver	Biopsy	Nil	Moderate	moderate	40	No	2
2.	Rangathal	55	F	7123	3 mon	RIF, LIF& umbilical	moderate	Ascending colon growth,ascites, peritoneal seeding,liver nodule	Biopsy	Nil	Moderate	moderate	50	No	2
3.	Dhanalakshmi	55	F	7654	3 mon	RIF & umbilical	moderate	Adhesions caecum, appendix, ileum	Adhesiolysis, appendicectomy	Nil	None	None	100	No	2
4.	Shaik	28	M	89975	2 yrs	RIF & umbilical	mild	Thickened appendix	appendicectomy	Nil	None	None	90	No	2
5.	Sulaiman	17	M	10276	3 mon	RIF	moderate	Adhesions caecum, parietal wall, thickened +appendix, mesenteric nodes	Adhesiolysis, appendicectomy, mesenteric node biopsy	Yes	None	None	120	No	2
6.	Devi	29	F	11098	6 mon	Rt upper abdomen	moderate	Adhesions of omentum, parietal wall	Conversion into laparotomy	Nil	None	None	30	Yes	6
7.	Viji	35	F	12736	2 Yrs	Rt upper abdomen	mild	Small bowel adhesions in previous kochers scar	Adhesiolysis	Nil	None	None	90	Yes	3
8.	Vathsala	45	F	15478	3 mon	RIF	severe	Adhesions of omentum to prevLSCS scar	adhesiolysis	Nil	None	None	90	No	2

9.	Saroja devi	37	F	17836	3 mon	RIF	moderate	Adhesions of omentum to the previous midline lscs scar	adhesiolysis	Nil	None	None	90	No	2
10.	Loganayagi	16	F	19083	3 mon	RIF	moderate	Thickened appendix, mesenteric node	Appendicectomy & node biopsy	Nil	None	None	90	No	2
11.	Praveen	17	M	22325	3 mon	RIF	moderate	Thickened retrocaecal appendix with adhesions	appendicectomy	Nil	None	None	90	No	2
12.	Vimala	38	F	22876	6 mon	Lt upper abdomen	Moderate	Normal	Nil	Nil	None	None	30	No	1
13.	Muthu	40	M	23876	9 mon	Lt lower abdomen	Moderate	Normal	Nil	Nil	None	None	30	No	1
14	Ram kumar	35	M	27650	1 yrs	Peri umblical	Moderate	Paraumbilical hernia with omental adhesion	Hernioplasty	Nil	None	None	120	No	3
15	Balamani	24	F	28790	6 mon	Periumblical	Severe	Incisional hernia with omental adhesion	Hernioplasty	Wound infection	Mild	none	130	Yes	7
16	Subaiyan	55	M	28760	6 mon	Periumblical	Moderate	Growth in the ileum	Conversion in to laparotomy	Nil	None	None	30	No	8
17	Kannaiyan	32	M	29876	3 mon	Rt lower abdomen	Severe	Multiple military mottling, fibrinous bands	Omental biopsy Tb abdomen	Nil	Mod	None	40	No	2
18	Rajee	24	F	30176	3 mon	Rt and lt lower abdomen and periublical region	Severe	Fibrinous adhesion free fluids omental deposits	Omental biopsy Tb abdomen	Nil	Moderate	None	40	No	2
19	Meenakshi	18	F	32897	6 mon	Rt lower abdomen	Severe	Thickened appendix, mesenteric node	Apendicectiomy, & Nodal biopsy	Nil	None	None	90	No	2
20	Saravanan	15	M	35462	4 mon	Rt lower	Moderate	Thickened appendix,	Appendicectomy &	Nil	None	none	80	No	2

						abdomen		mesenteric nodes	nodal biopsy						
21	Radhamani	20	F	36578	3 mon	Rt and Lt upper abdomen, periumblical	Severe	Fibrous adhesion between small bowels	Adhesiolysis	Nil	None	none	100	No	3
22	Muthukumar	55	M	39876	2 yrs	Rt upper abdomen	Moderate	Omental mass with transverse colon adherent to scar	Omental biopsy	Nil	Moderate	moderate	60	No	2
23	Ramathal	40	F	40127	3 mon	Rt lower abdomen	moderate	Fibrous adhesion,omental deposit	Omental biopsy	Nil	None	none	70	No	2
24	Sarswathi	55	F	42786	3 mon	Rt lower abdomen	Moderate	Thickened appendix	Appendicectomy	Nil	None	none	90	No	2
25	Karuppusamy	55	M	43265	6 mon	Rt lower abdomen	Moderate	Mass formed by caecum ileum and omentum	Omental biopsy HPE :Mesothelioma	Nil	Mod	none	60	No	2
26	Somasekar	25	M	45342	3 mon	Lt lower abdomen	Moderate	Multiple tubercle	Biopsy	Nil	None	none	50	No	2
27	Ramathal	28	F	46543	6 mon	Rt lower abdomen	Severe	Thickening of bowel ang mesentry	Biopsy	Nil	None	nil	60	no	2
28	Thangamani	30	F	48543	6 mon	Lt lower abdomen	moderate	Normal	Nil	Nil	None	none	40	No	1
29	Manikandan	22	M	52165	3 mon	Rt lower abdomen	Moderate	Thickened appendix	Appendicectomy	Nil	None	None	90	No	2
30	Nithya	20	F	53643	4 mon	Rt lower abdomen	Moderate	Thickened aappendix, mesenteric adenitis	Appendicectomy,nodal biopsy	Nil	None	None	90	No	2

A PROSPECTIVE STUDY OF DIAGNOSTIC LAPAROSCOPY IN CHRONIC ABDOMINAL PAIN

Dissertation submitted in partial fulfillment of regulation for the

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(Branch I)